3/15/17

"Experience enables you to recognize a mistake when you make it again."-Franklin P. Jones

HW: "Exponential Functions Basics" homework section
Test Friday 3/17

AIM: What are Exponential Functions?

Warm Up:

inverse of f(x)

1. If $f^{-1}(x)=\frac{1}{3}x+7$ then which of the following is the correct formula for $f(x)$?

$y=\frac{1}{3}x+7$ → switch x and y → $x=\frac{1}{3}y+7$

(1) $f(x)=-\frac{1}{3}x-7$ (3) $f(x)=3x-7$

(2) $f(x)=3x-21$ (4) $f(x)=-3x+21$

$\frac{3}{1}(x-7)=\frac{3}{1}\frac{1}{3}y$

$3x-21=y$

$f(x)=3x-21$

Average rate of change $\frac{f(b)-f(a)}{b-a}$

$f(-3)=-7$

2. The function $f(x)$ is an odd function with $f(3)=7$ and $f(9)=11$. What is the average rate of change of $f(x)$ over the interval $-3\le x\le 9$?

a b

$\frac{f(9)-f(-3)}{9-(-3)}=\frac{11-(-7)}{9-(-3)}=\frac{18}{12}=\frac{3}{2}$

(1) $\frac{1}{3}$ (3) 3

(2) $\frac{3}{4}$ (4) $\frac{3}{2}$

You studied exponential functions extensively in Common Core Algebra I. Today's lesson will review many of the basic components of their graphs and behavior. Exponential functions, those whose exponents are variable, are extremely important in mathematics, science, and engineering.

b is the base

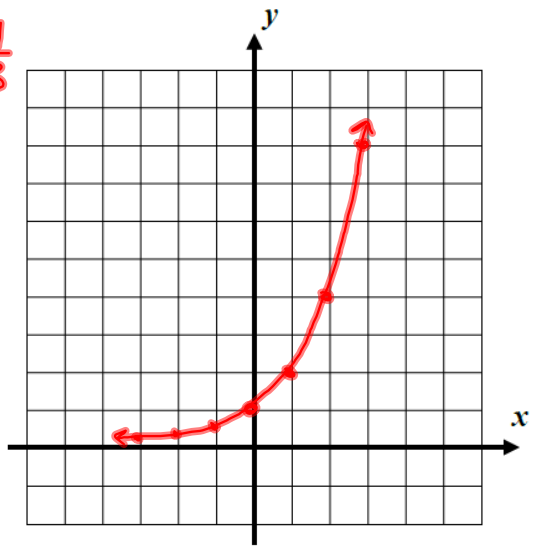
BASIC EXPONENTIAL FUNCTIONS

$y = b^x$ where $b > 0$ and $b \neq 1$

***Exercise* #1:** Consider the function $y = 2^x$. Fill in the table below without using your calculator and then sketch the graph on the grid provided.

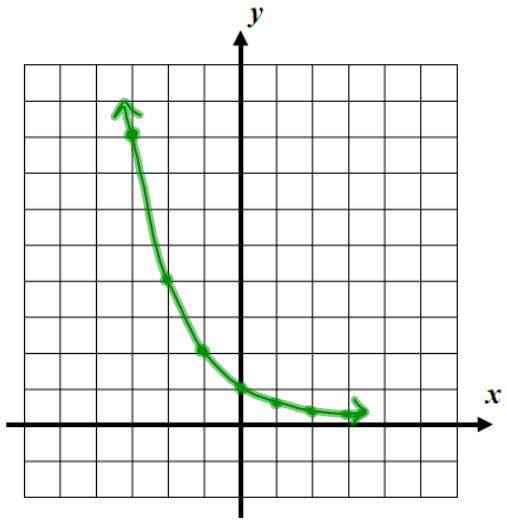
$2^{-3} = \frac{1}{2^3} = \frac{1}{8}$

x	$y = 2^x$
−3	$\frac{1}{8}$
−2	$\frac{1}{4}$
−1	$\frac{1}{2}$
0	1
1	2
2	4
3	8



***Exercise* #2:** Now consider the function $y=\left(\frac{1}{2}\right)^x$. Using your calculator to help you, fill out the table below and sketch the graph on the axes provided.

x	$y=\left(\frac{1}{2}\right)^x$
−3	8
−2	4
−1	2
0	1
1	$\frac{1}{2}$
2	$\frac{1}{4}$
3	$\frac{1}{8}$



***Exercise* #3:** Based on the graphs and behavior you saw in *Exercises* #1 and #2, state the domain and range for an exponential function of the form $y = b^x$.

x

Domain (input set):

$(-\infty, \infty)$

All Real #s

y

Range (output set):

$(0, \infty)$

$y > 0$

***Exercise* #4:** Are exponential functions one-to-one? How can you tell? What does this tell you about their inverses?

yes they are 1 to 1 functions b/c they pass the horizontal line test.

The inverses will be functions too!

***Exercise* #5:** Now consider the function $y = 7(3)^x$.

x=0

(a) Determine the y-intercept of this function algebraically. Justify your answer.

$y = 7(3)^0$

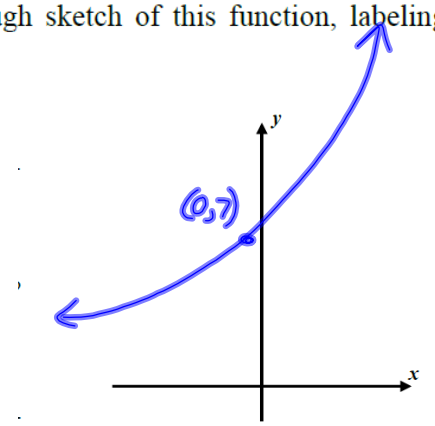
$y = 7(1)$

$y = 7$

(b) Does the exponential function ~~increase~~ or decrease? Explain your choice.

Increases because the base is bigger than 1.

(c) Create a rough sketch of this function, labeling its y-intercept.



Exercise #6: Consider the function $y = \left(\frac{1}{3}\right)^x + 4$.

(a) How does this function's graph compare to that of $y = \left(\frac{1}{3}\right)^x$? What does adding 4 do to a function's graph?

Shifted up 4 units.

(b) Determine this graph's y-intercept algebraically. Justify your answer.

$y = \left(\frac{1}{3}\right)^0 + 4$

$y = 1 + 4$

$y = 5$

(c) Create a rough sketch of this function, labeling its y-intercept.